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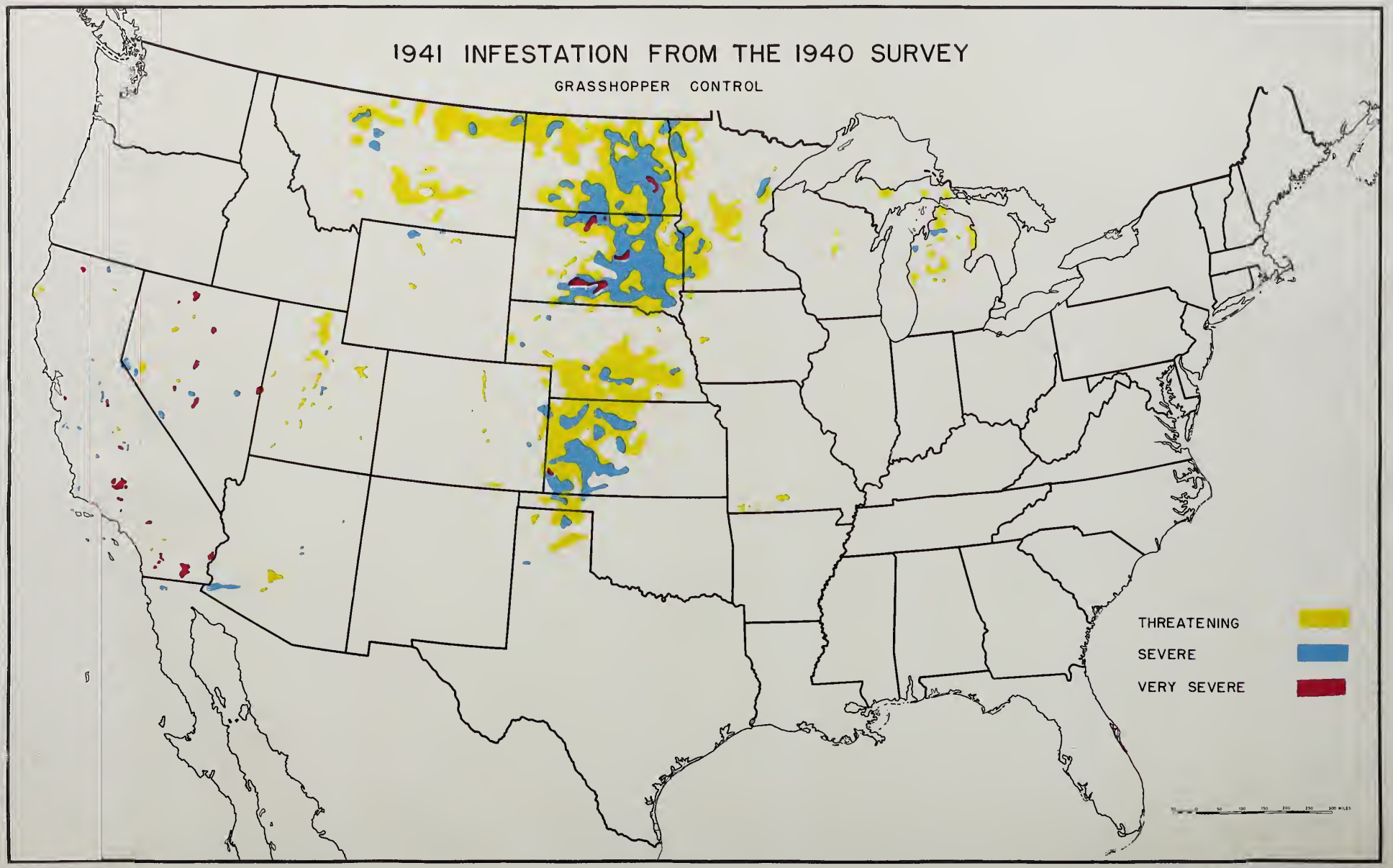

1941 INFESTATION FROM THE 1940 SURVEY
GRASSHOPPER CONTROL
THREATENING
SEVERE
VERY SEVERE
BUREAU OF AGRICULTURAL ECONOMICS

I N S E C T P E S T S U R V E Y B U L L E T I N

Vol. 20 Summary for 1940 No. 10

INTRODUCTION

The winter of 1939-40 averaged below normal in nearly all sections east of the Great Plains, except for a considerable area from the central lake region westward, with the greatest minus departures over a large southeastern area. From the Rocky Mountains westward, the winter was decidedly warmer than usual.

Precipitation was above normal over most of the western part of the country and very scanty over the eastern part, in some places amounting to less than half the normal rainfall.

The area of severe cold weather, except in the Gulf and South Atlantic States, had sufficient snow cover to protect hibernating insects; therefore survival was about the same as usual, but in the Southeastern States the cold affected insect populations adversely. Scale insects and aphids were reduced when citrus trees were defoliated by freezing temperatures; however, the aphids rapidly increased when the new tender growth started. The San Jose scale suffered high mortality in the Fort Valley district of Georgia, where more than usual infestation had built up. On account of the scarcity of blooms, flower thrips were reported in very small numbers, in the Southeast, northward to North Carolina. The survival of the boll weevil was the lowest recorded for many years and the lowest on record at Tallulah, La. The banded cucumber beetle, usually active all winter, was killed extensively and cutworms were rendered less active. Pea aphid was killed in the Gulf States. On the other hand, several species of aphids on truck crops around Norfolk, Va., were able to withstand the cold and continued to reproduce all winter.

April and May were characterized by abnormally cool and wet weather in the eastern part of the country and continued warmth in the West. This was most unfavorable to the chinch bug; and in spite of the fact that the great populations that went into hibernation in the fall of 1939 survived the winter, migrations by the adults from winter quarters to cultivated fields was slow and development of the first brood was delayed and prolonged. The weather likewise interfered with hatching of grasshopper eggs and the development of the young hoppers over much of the infested area. The cool, rainy weather was favorable to activity by cutworms and root and seed maggots.

The summer was cooler than normal over the eastern part of the country, but warmer west of the Rocky Mountains.

Precipitation was deficient in the Northeast, the central and western parts of the Ohio Valley, in Missouri, and in the central Plains States, but was generally above normal throughout the central and eastern parts of the country. Deficiencies occurred from the Rocky Mountains westward.

The fall was abnormally warm except in the Northeast and along the Atlanti and Gulf coasts. It was very warm in the upper Mississippi and Missouri Valley and in the Great Plains.

The fall weather was favorable to insect development and many species continued activity later than usual and built up heavy populations to go into hibernation. Of these the chinch bug, the boll weevil, and the codling moth were outstanding examples.

GRASSHOPPERS

The remaining infestations of the range grasshopper (Dissosteira longipennis Thos.) in Colorado and New Mexico were reduced to a status of noneconomic importance. This was due to cool, wet weather at hatching time in certa areas, to the work of predators and parasites, and to intensive control practices.

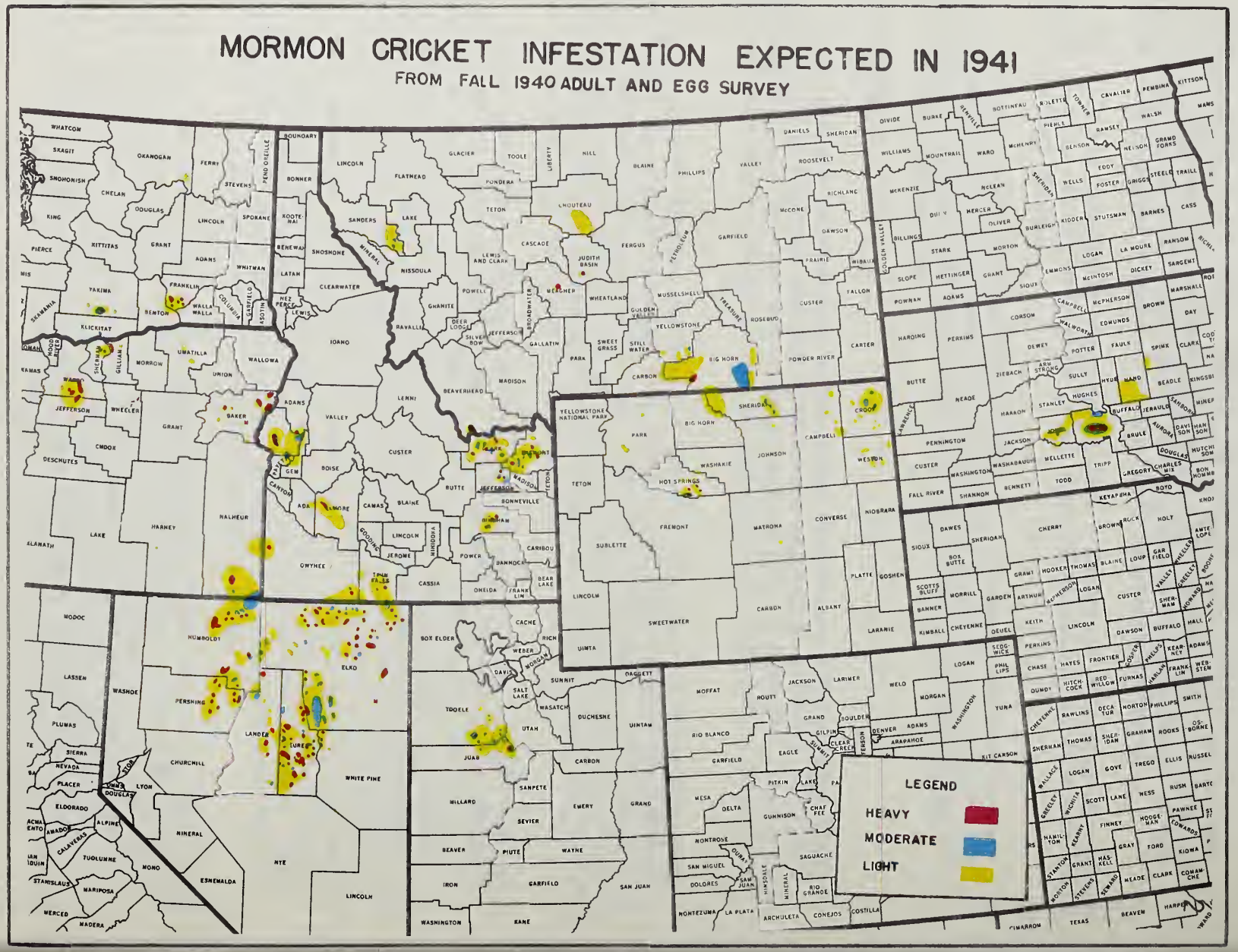
North-central Montana was heavily infested with eggs of Melanoplus mexicanus Sauss. by adults that flew into that area in 1939. Large-scale flights failed to develop from the above area, owing to control work. Only minor crop losses were sustained in the area as a whole, whereas just across the adjacent Canadian border, where grasshopper populations were similar but where little bait was spread, crop destruction was complete.

Second-generation adults of M. mexicanus deposited eggs in 1939 over extensive areas of idle and waste lands in southeastern Colorado, the Panhandle of Oklahoma, and in northern Texas. General but not heavy flights of first-generation adults spread the species over most of the counties of western Kansas. Late in September 1940 second-generation adults of M. mexicanus began migrating in western Kansas and southern Nebraska. By mid-October flights extended the infestation 100 miles into Texas. Field margins of wheat were completely destroyed in considerable areas in the southern part of the infestation. Control activities by farmers increased materially and were continued into the early part of November. Subsequent low temperatures, together with parasitization and other natural causes, resulted in almost complete destruction of live grasshoppers in the second-generation area.

Little has been known of Aeoloplus turnbullii Thos. as an economic specie It caused severe marginal and considerable field damage in Kansas in 1939, was predominant there in adult and egg surveys, and it seemed probable that this species might cause heavy crop damage in 1940. In 1939 marginal growths of weeds dried up, forcing the species to migrate into fields. Weather conditions in 1940 favored the harboring of the species in marginal vegetation, therefore little migration to fields took place and little crop damage resulte

MORMON CRICKET INFESTATION EXPECTED IN 1941

FROM FALL 1940 ADULT AND EGG SURVEY



The species M. occidentalis Thos. occurs in several of the Western States. It has been considered as restricted to range land areas and to have little bearing on crop protection. In 1938 the species was known to be present in only a small area in the northwestern part of Nye County, Nev., but has spread materially, covering some 86,500 acres, as estimated by the 1940 fall adult survey. Crop damage by M. occidentalis has remained insignificant and range destruction has not been great, except in localized areas. Populations of M. mexicanus expected in eastern Wyoming and northern and northeastern Colorado did not develop. The hatch was light during the protracted rainy, cool weather late in the spring, with an apparent further reduction of early instar nymphs.

Data obtained from egg surveys in the fall of 1940 indicate a general downward trend of infestation for 1941, with larger populations in South Dakota, North Dakota, Minnesota, Kansas, Nebraska, and Montana. (See map.) (B. M. Gaddis, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

MORMON CRICKET

According to the adult and egg surveys conducted in the fall of 1940, more than 8,000,000 acres of land were infested in the nine States included in the surveys, about 5,000,000 acres less than in 1939. The widespread infestation formerly present in Montana has been reduced by approximately 3,000,000 acres. Severe infestations in Wyoming have also been greatly reduced in size. Increases in the size of severe infestations have occurred in parts of Oregon, Nevada, and Idaho. A marked decrease in the number of heavily infested acres has been noted in 1940, as compared with 1939. The number of moderately infested acres has increased by approximately 50,000, and the total number of heavily and moderately infested acres within 5 miles of agricultural lands has decreased by about 300,000. The number of lightly infested acres has decreased by about 4,000,000. Results of the egg survey conducted in the autumn of 1940 indicate that the Mormon cricket outbreak in 1941 may be most evident in northern Nevada, southeastern Oregon, and southern Idaho, with less aggravated conditions in the neighboring Rocky Mountain States. Mormon cricket eggs deposited in the Big Horn Mountains of Big Horn and Sheridan Counties, Wyoming, in 1939, did not hatch in 1940, but many of these eggs were showing considerable embryonic development in the fall of 1940. The accompanying map shows the infestation expected in 1941. (B. M. Gaddis, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EUROPEAN CORN BORER

Following a winter during which European corn borer mortality over the infested area as a whole was about average, borer development during the 1940 season was characterized by late oviposition, associated with delayed pupation and emergence or with prevailing low temperatures subsequent to emergence being reflected in retarded oviposition. In the Lake States area an increased trend toward a second generation was observed, particularly in the southern part of the infested part of Indiana and in southwestern Ohio. Distribution records of the occurrence of the corn borer in 1940, principally by State personnel, have established the presence of the borer in the following counties not previously reported as infested: Champaign, De Kalb, Ford, Grundy, Iroquois, Kane, Kendall, Livingston, McHenry, McLean, Vermilion, and Winnebago in

Illinois; Harford in Maryland; Brown in Ohio; Essex, Isle of Wight, James City, and New Kent in Virginia; and Columbia, Portage, Walworth, and Waushara in Wisconsin.

The Bureau of Entomology and Plant Quarantine and the interested States cooperated again in the fall of 1940 in a survey to determine the relative abundance of the borer over a considerable portion of the infested territory. Significant increases in abundance in 1940 from 1939 occurred in comparable surveyed sections of Indiana, Ohio, western New York, Long Island, N. Y., New Jersey, Delaware, Maryland, and Virginia; significant decreases in Vermont, Massachusetts, Connecticut, and Rhode Island; and no significant changes in the levels of population in Wisconsin, Michigan, Bucks County in Pennsylvania, eastern New York proper, New Hampshire, and Maine. Infestation in the few counties surveyed in southeastern Wisconsin in 1940 was light, as in 1939, whereas in southeastern Michigan larval populations continued at high levels. Population levels in Illinois were very low. The increases in abundance of th insect from 1939 to 1940 in the surveyed portions of Indiana and Ohio brought the populations in these States to the highest levels on record, and in the 4 counties surveyed along the southern edge of Lake Ontario in western New York, the borer reached its maximum abundance for that section of the country. Although less abundant throughout New England and in eastern New York proper in 1940 than in 1939, the corn borer was much more numerous southward along the Atlantic coast from Long Island through New Jersey, Delaware, Maryland, and Virginia. The highest infestations per county in 1940 occurred in Nassau County, Long Island, N. Y., and Niagara County, N. Y., which averaged 742.2 and 709.6 borers per 100 plants, respectively. Other relatively high populations--501 to 700 borers per 100 plants--were found in the counties of Gratiot and Sanilac, Mich.; Columbia and Orleans, N. Y.; Fairfield, Conn.; Burlington, N. J.; and Accomac and Princess Anne, Va. Some of the highest populations of the European corn borer known in the United States were observed in Princess Anne County on the mainland of Virginia where the average number of borers per 100 plants determined by the survey was 601.2. Individual corn plants in some fields in this county contained more than 100 corn borer larvae.

In general, infestations in early market sweet corn were much lower in 1940 than in 1939, averaging about 5 borers per plant in the most heavily infested fields in truck-crop sections in New Haven County, Conn.; Burlington County, N. J.; Albany and Columbia Counties, in the Hudson River Valley, N. Y.; and Lucas County, Ohio. The 3 fields observed in Burlington County, N. J., with the highest infestations averaged 16, 14, and 13 borers per plant, respectively. The average of 28 borers per 100 plants observed in early market sweet corn in Maine was lower in 1940 than in comparable counties surveyed in 1939. A detailed account of the corn borer, together with a map, was published as Supplement to No. 9 of the Insect Pest Survey Bulletin, December 20, 1940. (C. M. Packard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

CHINCH BUG

The seasonal development of the chinch bug during 1940 roughly paralleled that of the two previous years, in most of the infested area. Hibernation surveys made late in the fall of 1939 and early in the spring of 1940 showed

the bugs present in threatening numbers from central Ohio across Indiana, Illinois, southern Iowa, and Missouri to eastern Kansas, eastern Nebraska, and northeastern Oklahoma. Although considerable winter mortality was reported from many sections of the area, it was not sufficient to materially reduce the potential threat of infestation. A cold spring delayed emergence of the overwintering adults and heavy rains during the development of the first-brood nymphs reduced the threatening heavy general infestation to moderate spotted outbreaks, especially over the eastern part of the area. Ohio reported practically no crop damage. West of the Mississippi River damage was more general and serious over most of the infested area. Slight local damage by the first brood was also reported from Pennsylvania, Tennessee, and Arkansas. Over most of the infested area drought in the fall favored the development of the nymphs of the later broods and the subsequent migration of adults to winter quarters. (Philip Luginbill and Curtis Benton, Bureau of Entomology and Plant Quarantine U. S. D. A.)

Results of the survey to determine the extent and intensity of chinch bug infestations in the States of Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, Oklahoma, and South Dakota, conducted during November 1940, indicate that the infestations will, in general, probably be lighter than those of 1939. Centers of infestation have apparently moved to the north and west, where winter mortality will probably be heavy. In Iowa and Missouri, the infestations appear to be lighter and more scattered, while those in Kansas, Oklahoma and Nebraska are expected to be heavier and more widespread. The situation in Indiana and Illinois apparently has not changed appreciably over that of the previous year. The survey this fall was extended to several counties in southeastern South Dakota, where moderate infestations involving all or parts of five counties were found.(B. M. Gaddis, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

HESSIAN FLY

At harvest time the surveys of wheat stubble indicated that hessian fly infestations were low in wheatfields throughout Maryland, Delaware, northeastern and southern Virginia, south-central Pennsylvania, north-central North Carolina, Ohio, Indiana, Michigan, southern Illinois, west-central Tennessee, and northern and southeastern Missouri. Infestations ranged from low to moderate in north-central Pennsylvania, northwestern Virginia, Kentucky, eastern Tennessee, eastern Illinois, and in south-central and eastern Kansas. Infestations were low to heavy in southeastern Nebraska. From moderate to heavy infestations of the hessian fly occurred in eastern and western Pennsylvania and in southwestern Missouri. The infestations of hessian fly were generally low or lacking in fall-sown wheat throughout the Eastern and Central States in 1940. Dry weather existed at the time of the regular emergence of the fly and at the time of wheat seeding and there was low or no larval establishment in volunteer and regularly sown wheat. Hence, the outlook is favorable for a light brood of hessian fly in the spring of 1941 in the States east of the Mississippi River. In the winter-wheat-growing areas from Iowa to Kansas, the populations increased during the fall of 1940. The weather conditions were favorable for an early emergence of the fly and for infestations to volunteer wheat. In Iowa there was considerable rain during the summer and early part o:

the fall with a probable increase of the fly, although very little, if any, commercial fly losses are anticipated in 1941. In the southeastern counties of Nebraska and the central and eastern counties of Kansas there were heavy local rains late in July and early in August, which favored an early emergence of the fly and promoted an unusual growth of early volunteer wheat. Moderate to heavy infestations exist in this volunteer wheat. In Nebraska the regularl sown wheat is relatively lightly infested; whereas in Kansas, owing to a brood of flies from volunteer wheat, from low to high infestations are general in both regular and late-sown wheat throughout the eastern half of the State. Th infestations in Kansas are higher and more universally distributed than in any year since 1927. A menacing brood of hessian fly in both Nebraska and Kansas in the spring of 1941 may be expected, if weather conditions are favorable. (Compiled from information supplied by Federal and State agencies; W. B. Cartwright, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

WHITE-FRINGED BEETLE

Inspection during 1939 was confined principally to delimiting the areas known to be infested in 24 counties or parishes in Alabama, Florida, Louisiana and Mississippi. One new major infestation was found in the vicinity of Hattiesburg, Miss., where both species of the white-fringed beetle were found, with Pantomorus peregrinus Buch. predominating. An isolated infestation of P. leucoloma Boh. was also found at Maxie, Miss., 24 miles south of Hattiesburg. Large acreages were added to the infestations at Monroeville, Ala., New Orlean La., and Pensacola, Fla. By the end of 1939 the known infested acreage had increased to 74,221 acres. Beetle populations were generally reduced throughout the infested areas to the point where economic damage was very slight in 1940, and in many places it was difficult to find the adults during the season. Inspections conducted during the 1940 season were confined chiefly to work aroun the periphery of known infestations and to railroad lines and highways leading out of the infested areas. Some additional infested properties were found, mo of which were adjoining or near old infestations. Important new infestations included approximately 2,000 acres about 5 miles west of Pensacola, Fla.; approximately 600 acres northwest of the Mobile, Ala., quarantined area; and about 1,000 additional acres in Long Beach, Miss. Large acreages were also added to the known infested areas at Florala and Monroeville, Ala., and New Orleans, La. A total of 13,649 acres was found infested during 1940. On September 30, 1940, the total acreage known to be infested by the white-fringe beetle was 87,898 acres. (B. M. Gaddis, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

VETCH WEEVIL

Comparatively slight spread of the vetch weevil was observed in 1940. In Pennsylvania it was found for the first time in Cumberland County, along the roadside on Route 34, between Carlisle and Arendtsville. It was also discovered in Henry County, Va., in June 1940. The adult was very late this year, the first individuals being swept at Arendtsville on June 3. In Oregon the insect was found in 1940 for the first time in Polk and Columbia Counties, in addition to those counties reported in 1939. In Washington State no extension of infestation was observed beyond the counties reported in 1939. (C. M. Packard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

LEGUME WEEVIL, OR EGYPTIAN ALFALFA WEEVIL

In April 1939, specimens of a weevil not heretofore reported as occurring in this country were collected in the Yuma Valley, near Yuma, Ariz., and later identified as Hypera brunneipennis Boh., which had originally been described from Egypt. In order to determine the extent to which this weevil had spread, and also obtain information as to its potential importance as an economic pest, a survey was begun in January 1940. Inspections were made of alfalfa and sour clover throughout the alfalfa-growing regions of the southern half of Californi southern Nevada, Arizona, southern New Mexico, and western Texas. The results of this survey indicated a slight increase in the area previously established as infested in the vicinities of Yuma, Ariz., and Winter Haven, Imperial County Calif. A small, light infestation was also discovered at Tempe, Ariz. (B. M. Gaddis, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

After aestivating throughout the summer and fall months, adults of the Egyptian alfalfa weevil began migrating to fields in Yuma Valley late in November. Migration was virtually completed by mid-December, but field populations appeared considerably smaller than last year. Consequently, damage during the winter and spring of 1941 now appears unlikely. Earliest emerging adults began ovipositing during the first week of December and virtually all were ovipositin by the latter part of that month. Rainy, cool weather during the latter half of December, however, minimized egg production and retarded hatching to the extent that no larvae had yet appeared in the field on December 27. (C. M. Packard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SUGARCANE BORER

The winter of 1939-40 was one of the coldest on record in the area infeste by the sugarcane borer and the coldest in Louisiana since that of 1898-99. Borers surviving the winter in sugarcane in Louisiana were only about one-tenth of the number surviving the winter of 1938-39, which was about a normal Louisiana winter. Borer survival in southern Florida was not so much reduced, althou the infestation was below normal at the time limited examinations were made in that area in September, in cooperation with J. W. Wilson of the Florida Agricultural Experiment Station. The borer population surviving in rice stubs in Louisiana was found by W. A. Douglas to be less than half of that surviving a normal winter. Borers emerged from hibernation in Louisiana from 2 to 3 weeks later than normal. Infestation by the first-generation borer in sugarcane was about one-twelfth of that for the same generation in 1939, and for the second generation it was about one-tenth of that in 1939. Based on a survey made jointly with A. L. Dugas of the Louisiana Agricultural Experiment Station at harvest time, the percentage of joints bored in Louisiana in 1940 was estimated to be 5.3. Estimated percentages of joints bored in 5 previous years based on similar surveys were: 1939, 19.7; 1938, 15.9; 1937, 16.1; 1936, 8.7; and 1935, 8.1. (C. M. Packard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PARLATORIA CHINENSIS MARLATT

In May 1940, infestations of a diaspine scale, Parlatoria chinensis Marlat' not heretofore reported as occurring in this country, were discovered in St.

Louis, Mo. This scale has been reported from China, Japan, Egypt, and India. In order to determine the extent to which this scale might have spread within the city of St. Louis, and also its potential importance as an economic pest, a survey by the Bureau in cooperation with the Missouri State Department of Agriculture was begun in December 1940. Up to January 15 thorough inspection of parks and other locations within the city of St. Louis has disclosed infestations in only 2 places—1 in the immediate neighborhood of the Missouri Botanical Gardens and another north of Forest Park. It has been found on approximately 48 different genera of plants and no conclusion has as yet been reached as to a favored host. Information is also being obtained as to destinations of plants which have been moved from the infested area during the last several years, and such destinations are being inspected or are reported to State officials. (B. M. Gaddis, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

JAPANESE BEETLE

The 1939-40 brood of the Japanese beetle was generally characterized by retarded development in all its stages. Prehibernation larval development in the fall of 1939 was retarded, and climatological conditions during the spring of 1940 further retarded late larval development. As a result, beetle emergence was consistently from 10 days to 2 weeks later than normal throughout the infested areas. No detailed survey of the regional concentration of the beetles in the area of general distribution, such as has been made annually for the last several years, was carried out in 1940, but observations were made of the situation in connection with other field work. A marked increase in beetle abundance and spread was noted in southwestern Connecticut, while the infestation in Westchester County and the western half of Long Island in New York was fully as heavy as in the preceding year. In New Jersey the northern part of the State below the hilly region had a dense beetle population; in the central portion where the infestation has been rather sparse for several years, beetle abundance has so increased that tree injury and marked feeding on soybeans and corn were common; in the southern portion, particularly in Salem and Cumberland Counties, the infestation was fully as heavy as during the previous year. In Pennsylvania the infestation in the southeastern portion, particularly in lower Chester and Lancaster Counties, has remained very heavy, but in the Harrisburg area a marked decline in the infestation was noted. In the northeastern part of Maryland, from the latitude of Baltimore northward to the Pennsylvania line, the infestation continued extremely heavy. The same condition prevailed in the upper half of Delaware. The secondary centers of localized heavy infestation on the Eastern Shores of Maryland and Virginia have increased markedly in both intensity of infestation and local dispersion, as compared with the situation in 1939. The development of the infestation on the Eastern Shore Peninsula is especially interesting in view of the rather limited pasture lands suitable as breeding areas. The infestation in the District of Columbia and adjacent portions of Maryland and Virginia has increased markedly in both extent and intensity, as compared with the situation in 1939. This heavily infested area now comprises approximately 290 square miles. In New England increase in both beetle abundance and local dispersion was observed in 1940 at a number of the known localized centers of heavy infestation, particularly at South Egremont and Worcester, Mass.; Keene, N. H.; Providence, R. I.; and Hartford and New Haven, Conn. A very heavy localized infestation in White River Junction, Vt.,

was reported by State authorities. No evidence of noticeable increase in infestation in 1940 over that found in 1939 was observed at Concord and Dover, N. H., and Springfield, Mass. Throughout the area of general infestation, the late emergence of the adult beetle population in the summer of 1940, together with generally cool late summer and early fall weather, very materially retarded fall larval development. A marked predominance of second-instar larvae far beyond the normal was found late in September. While most of the larvae had developed to the third instar before going into hibernation, the relative size of the over wintering larvae is generally small. (C. H. Hadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

An infestation of no great commercial importance but of more than usual interest, was that of Japanese beetles on sun-grown tobacco in Manchester, Conn. While the infestation, like that in shade tents in 1939, was apparently due to force of circumstance, in this case the mowing of an adjoining field containing Polygonum, it may nevertheless presage future infestations of tobacco by this insect. It was found that the beetles, after feeding on tobacco, showed a preference for it over wild grape, smartweed, and other plants. (A. W. Morrill, Jr., Bureau of Entomology and Plant Quarantine, U. S. D. A.)

CODLING MOTH

The codling moth passed the winter successfully over the eastern part of the country, survival being higher than usual everywhere except possibly in Missouri where there was 75-percent mortality above the snow line in the northwestern part of the State. Emergence of spring moths started the first week in May in Maryland, Kentucky, and Missouri, and the last week of May in New York. The first eggs were reported from Kentucky on May 10 and from Indiana on May 13. On account of cool, rainy weather development was delayed and prolonged, making control difficult. First-brood injury seemed to be greater than usual in New York, Ohio, Indiana, and Illinois, although in Delaware, Virginia, Missouri, and Kansas injury was lighter than usual. There was considerably more injury than usual in Maine and Connecticut. Favorable weather late in the season allowed a heavy third-brood population to build up, causing more than usual injury and permitting a high population to go into winter quarters.

PLUM CURCULIO

The plum curculio passed the winter and came out of hibernation in the spring in greater numbers than usual at Fort Valley, Ga. Unfavorable weather retarded development and the infestation there was later and lighter than usual. All varieties escaped an attack by the second brood. The curculio was reported as more abundant and injurious to apples and stone fruits in Delaware, Ohio, Indiana, Missouri, and Texas.

FRUIT APHIDS

Eggs of the fruit aphids were reported as very scarce throughout the northeastern quarter of the country. Early in the spring infestation was very light. During the last of May and early in June, infestations of the rosy apple aphid particularly, and also of the apple aphid built up in considerable numbers all over the country and resulted in considerable injury. The rosy apple aphid also

caused some damage in Washington.

ORIENTAL FRUIT MOTH

The oriental fruit moth caused about the usual amount of damage generally. Quite severe injury to fruit was reported from Connecticut, New York, New Jersey and Missouri. The insect was reported from Texas several times during the season on peach and plum. This is the first time the insect has been reported as injurious in the State. It was reported as having been collected there several years ago.

BEET LEAFHOPPER

The beet leafhopper populations in the fall of 1939 in the breeding areas of southern Idaho, northern Utah, and California were the lowest for several years. Winter survival in these areas was also low; however, in the spring ideal weather conditions in southern Idaho was responsible for a heavy reproduction of the insect and luxuriant growth of its food plants. Surveys of commercial beanfields in July showed that curly-top injury to garden varieties grown for seed ranged from 1.75 to 44.0 percent and to the Great Northerns from 0.25 to 8.5 percent. A survey of the curly-top infection in beetfields of Idaho and eastern Oregon was made in July and August 1940. The data showed that 99.2, 84.4, and 26.2 percent of the beets in the western Idaho-eastern Oregon, south-central Idaho, and eastern Idaho areas, respectively, were infected with curly top. There was also a reduction in the average grade of curly-top severity from 2.5 for the western Idaho-eastern Oregon to 1.6 for the south-central Idaho and 1.3 for eastern Idaho areas. A comparison of the average curly-top infection in all districts shows that 68.9, 37.7, and 75.7 percent of the plants were infected during the seasons of 1938, 1939, and 1940, respectively. In northern Utah, sugar beets and tomatoes were subjected to a great influx of long-distance migrant leafhoppers in April from southern Idaho, southern Nevada, and northeastern Arizona, resulting in five times as much damage as occurred in 1939.

In California the spring brood of leafhoppers remained in the foothills instead of moving out in the valley, as usual, and an enormous second brood matured in May; consequently, the heaviest migration since studies were started in 1930 occurred. The migrants reached the Sacramento Valley from May 10 to 1 but fortunately moved up the east side of the valley, missing the principal beet areas. Damage to sugar beets, except in small areas, was negligible. There was considerable damage to the tomato crop in the northern part of the San Joaquin Valley. In the early tomato district south of Merced, where the tomatoes are planted closely and staked, and were about ready to produce at the timeof the heavy migration, damage was at least 10 percent. In the canning-tomato area from Merced to Stockton, counts showed about 30 percent damage, although one or two fields that were carefully watched lost 60 percent of the plants. In the Sacramento Valley most of the tomatoes were set after migration. Damage, chiefly from the first summer brood, was about 5 percent.

In the Mesilla Valley, N. Mex., and the Salt River Valley of Arizona, where beets are grown for seed, the beet leafhopper infests the fields in the fall, but the damage is not fully evident until the following April. The

numbers of leafhoppers migrating into the beet fields in fall of 1939 were not alarming. Weather conditions during fall and winter were favorable to the insect and breeding occurred in the beets, which was unusual. Curly-top injury in the Salt River Valley was more severe than at any time since the industry was started in 1935. In the Mesilla Valley practically all beet varieties wer grown from resistant seed and very little damage occurred. Beet leafhopper migrations into seed crops in fall of 1940 in Salt River Valley were not large Moderate populations infested the fall crop in Mesilla Valley, N. Mex.

In southern Idaho and northern Utah considerable numbers of leafhoppers went into hibernation, but in California very low populations were present for hibernation.

MEXICAN BEAN BEETLE

During 1940 the Mexican bean beetle was far less numerous than usual in the Ohio River Valley in Ohio. Foliage injury to unsprayed garden beans along the Ohio River did not exceed 50 percent at any time and in most instances was less than that, as compared with conditions that prevail in most seasons, when unsprayed beans are completely defoliated at certain times; however, in the vicinity of Elyria, in the northern part of the State near Lake Erie, considerable damage was done and it was necessary to spray or dust the bean crop. In central Ohio it was also fairly numerous, but less so than in 1939. (N. F. Howard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

The Mexican bean beetle passed the winter of 1939-40 successfully in eastern Virginia and, owing to unseasonably cold weather in April, began emerging about a week later than usual. The peak of emergence of overwintered beetles from hibernation occurred in the last week in May. The beetle population in many fields of spring snap beans was unusually large, the average infestation on May 27 being 37 beetles and 37 egg masses on 25 feet of row in 1 field under observation. The beetle caused severe damage to bean foliage in many untreated fields of early snap beans but failed to seriously affect yields owing in most instances, to the advanced state of plant growth at time of attac Although a large population of first-brood beetles was present on summer crops of beans early in July, the infestation was practically wiped out as a result of an unprecedented heat wave throughout the area the latter part of the month. Damage to fall beans was therefore unusually light and insecticide sales were lower than in previous years, according to some dealers. (L. W. Brannon, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

TOMATO FRUIT WORM

The tomato fruitworm was very abundant along the Ohio River in the vicinit of South Point, Ohio, during 1941, when the percentage of wormy fruit reached 44. Records were taken every few days from June 29 to September 20 and it was found that the percentage of wormy fruit ranged from 15 to 44, reaching a peak on July 3 and a secondary peak on September 10. At Columbus and Marietta, Ohio, the natural infestation was very light and it is believed that this was generally the case throughout the State. J. J. Davis, of Indiana, informed me that there was no appreciable damage to canning tomatoes in Indiana during the 1940 season. (N. F. Howard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Infestations in southern California in general were very light during 19 averaging about 4-percent damage for fields harvested during July, August, and September. In one field harvested in October and November, infestation was normal, or about 17.5 percent. The infestation in corn throughout the season was apparently normal, averaging 83 percent for June, 95 percent for July, 8 percent for September, 92 percent for October, and 96 percent for November. (J. Wilcox, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Infestation by the tomato fruit worm in northern Utah averaged about 4 percent in 1940 and was slightly greater than in 1939. Early sweet corn in June was approximately 30-percent infested with corn earworm of the fourth an fifth instars, and by July almost 100 percent was infested. The infestation of the tomato fruitworm on tomatoes was noticeably higher in the southern par of Davis County than in any of the other tomato-producing districts. Infesta tion appeared to be greater in fields of rank growth, which was also associat with exuberant blossoming. The first eggs were observed on tomatoes during mid-July and eggs were recovered during the season up to the early part of September, the peak of oviposition of 1.3 eggs per plant occurring in mid-August. The collections from bait traps and light traps were small during 1940, yet the peak of collection from both of these sources occurred during m August. Oviposition studies in 1940 showed 92 percent of eggs deposited on tomato plants were recovered on small leaves and 79.2 percent were on the upp surface. F. H. Shirck reported that in 1940 the insect caused injury to toma for the first time in the Parma, Idaho, district. Injury to sweet corn has been common. (H. E. Dorst, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PEPPER WEEVIL

The 1940 season followed one of the warmest winters experienced for many years in California. A general lack of pepper field and nightshade clean-up until spring allowed an unusually large number of weevils to survive the winter. Weevil infestations, which began early in June, increased very rapid until an average of 60 percent of the crop was destroyed in Orange and Los Angeles Counties. Infestation records kept in three fields in Orange County and in two fields in Los Angeles County indicated a range of 47- to 89-percer damage, with an average of 64 percent by numbers of pods. Damage by weight i always less than damage by number of pods, because the early, larger, pods su vive. Early infestations also occurred in San Diego County, but most of the fields were thoroughly treated, which materially reduced losses. Weevil con-ditions look more favorable for 1941 because adult weevils entering the winte season were already old, and have less chance of surviving. This was due to the destruction of all small pods and blossom buds by a very large weevil population long before the season was over. Thus there were no young weevils emerging late in the fall to provide a vigorous population which might survi the winter. (Roy E. Campbell and J. C. Elmore, Bureau of Entomology and Plan Quarantine, U. S. D. A.)

PEA WEEVIL

Pea weevil infestation records for the Palouse area of Idaho and Washington for the 1940 crop season show that the average infestation for all localities in Idaho (Palouse area) was 3.75 percent and for all localities in Washington (Palouse area) was 4.17 percent. The average for the area as a whole was 4.17 percent. These figures are considerably lower than the averages for the crop year 1939, which were 8.40 percent for Washington, 10.48 percent for Idaho, and 9.04 percent for the area as a whole. (T. A. Brindley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SWEETPOTATO WEEVIL

In the period from July 1937 to the early part of 1940, surveys for sweetpotato weevil infestations had been conducted cooperatively with the States in 148 counties in Alabama, Georgia, Mississippi, and Texas. Thirty-nine of these counties (list attached) were found infested, and 26 of this number designated as areas in which the eradication of the weevil would be undertaken cooperatively. They are located in the areas of commercial production where wild host plants do not persist throughout the year, and where the pest does not persist the year round. To the close of 1940, weevils have apparently been eradicated from 11 of the above-named counties, and the number of infestations in other counties drastically reduced. More than 1,200 properties in the eradication areas have been found infested, and through subsequent control activities it has been possible to release 93 percent of these properties from quarantine.

In 1939, 7 counties in southern Arkansas were surveyed without finding the weevil. In 1940, Federal-State cooperative inspection was extended to that part of Louisiana lying north of the area where infestations were known to be generally distributed and no weevils were found. The work was conducted in 28 parishes lying north of and including East Feliciana, West Feliciana, Concordia, Catahoula, La Salle, Grant, Natchitoches, and Sabine. The inspection consisted of checking planting stock in the field, as well as the seed beds, and in some cases wild host plants also.

The counties infested from July 15, 1937, to December 1940, were as follows: Alabama: Baldwin, Butler[1], Conecuh[2], Mobile, total, 4; Georgia: Camden, Charlton,[2] Glynn, Thomas, total, 4; Mississippi: Amite,[2] Covington,[2] Forrest, Greene,[2] Hancock, Harrison, Jackson, Jefferson Davis[2], Jones, Lawrence[2], Marion, Pearl River, Pike, Stone, Walthall, total, 16; Texas: Angelina, Brazos, Cherokee, Gregg[2], Grimes, Lee, Milam, Nacogdoches, Sabine, San Augustine, Shelby[2], Smith[2], Upshur[2], Walker, Williamson, total, 16; grand total for the 4 States, 40 counties.

1/ Found infested in 1940.

2/ Weevils apparently eradicated from these counties.

(B. M. Gaddis, Bureau of Entomology and Plant Quarantine, U.S.D.A.

HORNWORMS

Hornworms (Protoparce spp.) were much less than normally abundant in the dark fire-cured area in 1940. The adults appeared several days earlier than usual and, as a result, the late June infestation was slightly greater than that of an average year. In July, August, and September, however, the infestation remained at a very low level, and it is doubtful if the average for the season was more than 25 percent of the usual infestation. Some farmers found it unnecessary to apply control measures at any time during the season and few of them treated their tobacco more than twice. Damage was negligible in most fields, and no instance of severe injury was noted during the entire season. It is believed that economic losses did not exceed 1 percent, as compared with the usual loss of approximately 10 percent. In the Kentucky burley area, where hornworms are always less abundant than in the dark fire-cured area, the infestation was unusually light and the damage correspondingly low. It is believed that the unusually cold winter preceding the 1940 season was largely responsible for the paucity of infestation, although the unusual abundance of parasites (Apanteles spp.) in August and September was a contributing cause. (L. B. Scott, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Despite the severe cold weather in South Carolina, hornworm pupae that were well surrounded by packed soil survived when only 2 inches below the soil surface. On the other hand, those larvae that were surrounded by loose porous soil, even though 7-8 inches below the surface, perished because water that accumulated in the loose soil apparently froze the pupae. The severe winter of 1939-40 apparently did not materially reduce the hornworm population. Where individual cells were used for hibernation studies, the number of pupae to survive was 24.8 percent of those that pupated. Larvae appeared on field plants as early as May 20 and were present throughout the remainder of the season, although they were not as numerous late in the season as in 1939. Population counts on 200 plants in a field during August showed an average of 3.19 worms per infested plant. (N. Allen, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Infestations in the fields in the vicinity of Oxford, N. C., during 1940, were lighter than usual. In some fields larvae of the first brood in June were abundant enough to make necessary the protection of the small plants. This infestation, heavier than usual for this time of the year, was followed, however, by second-brood infestations, which were much lighter than usual. Fewer moths per trap were caught during 1940 than during previous seasons. (J. U. Gilmore, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

In the Connecticut River Valley only slight damage was done to any fields by hornworms. The predominant species in this region is P. quinquemaculata and usually moderate to severe damage is done to isolated fields. In 1940 no such instances of severe damage occurred but the usual slight damage was found on a few plants in many fields. Parasitization by Apanteles congregatus Say, which is usually heavy, was not much in evidence. (A. W. Morrill, Jr., Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Moth-trap records indicate that the abundance of P. sexta in the Florida-Georgia tobacco districts was about normal. Relatively heavy oviposition during the period May 25 to June 22 was undoubtedly due to individuals of both the spring brood and the first brood. Sun-grown tobacco was injured rather severely in numerous instances, whereas the shade-grown crop sustained only minor losses. (F. S. Chamberlin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

CORN ROOT WEBWORM

The corn root webworm (Crambus caliginosellus Clem.), known locally as the tobacco crambid, was present in more than the usual number of fields around Clarksville, Tenn., but the infestation was unusually light. Only one report of severe damage was received in the entire season. In the areas where this insect is usually very abundant, the 1940 infestation in fields of newly planted tobacco was not sufficient to cause losses exceeding 3 percent. It is believed that the unusually low temperatures of the preceding winter caused the reduction. (L. B. Scott, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

TOBACCO BUDWORM

Infestations of the tobacco budworm were notably heavier in the Florida-Georgia tobacco district than usual throughout the tobacco-growing season. The insects caused some injury in sun-grown tobacco fields and to the upper leaves in shade-grown crops. (F. S. Chamberlin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

TOBACCO FLEA BEETLE

At Oxford, N. C., in an open grassy field, there was a beetle survival of Epitrix parvula F. in small cages of from 23.75 to 35 percent and in larger cages of from 15 to 22.83 percent. The average emergence for all cages was 23.25 per cent, which is practically the same as in former comparable studies. During April about 150 plant beds were examined over most of the North Carolina flue-cured tobacco-growing areas. Usually 10 $\frac{1}{4}$-square-foot samples were taken from each bed. The average beetle infestation per square foot ranged from 2.83 in the Border Belt to 5.44 in the Old Belt. These figures were only slightly less than those similarly obtained for 1939, but about two-fifths of the infestation encountered in 1938. The 1940 maximum infestations in the Middle and Old Belts were 21 beetles per square foot of plant-bed area. No records of a State-wide scope were taken during the spring of 1940 of infestations upon newly set tobacco; however, weekly records taken at Oxford, N. C., on a 1-acre field of untreated tobacco showed infestations of not over 5 beetles per plant from May 22 to June 28. In July infestations ranged from 9.97 to 26.97 beetles per plant. Harvest was begun late in July. A nearby field being protected by rotenone dust had on July 25 a maximum infestation of 30.49 beetles per plant. It is true that an infestation of 25 to 30 beetles per plant might cause severe damage to wrapper tobacco, but from 100 to 500 beetles would be needed to seriously injure the flue-cured tobacco plants. Such infestations normally occur in North Carolina late in the season in occasional fields; however, none were observed in 1940.

Cage studies at Florence, S. C., for the 1939-40 season showed that emergence of tobacco flea beetle began at least as early as February 19 and contin

through May 3. The emergence in cages was, for the most part, earlier and faster than that in nature, probably because cage covers produced abnormal conditions. The average survival in 30 cages was 12.28 percent, whereas similar studies in cages covered with heavier cloth in 1938-39 showed a survival of 27.56 percent. The tobacco flea beetle was not as abundant as normal on small plant-bed plants. A brood of beetles emerged in plant beds around June 10 but this emergence was too late to seriously affect the crop because transplanting was completed prior to that time. Where the beetles were permitted to remain undisturbed in the plant beds many plants were severely injured. The tobacco flea beetle was of less importance to field plants than in any year since 1936. Control measures were necessary at only 2 periods during the season. The first period was soon after the plants had been transplanted and the second period was during the latter part of July. Infestations were scattered and the beetles did not occur in outbreak numbers; however, a control experiment was conducted in a field of late tobacco, where the average number of beetles was 73 per plant.

Flea beetles (E. parvula) were less abundant in the Florida-Georgia tobacco districts than for several years. Relatively few applications of insecticides were needed to exert commercial control. The tobacco flea beetle caused moderate damage in an occasional plant bed, but the injury was much less than in an average year. Field injury was moderately severe, insofar as the lower leaves of tobacco were concerned, but, so far as is known, it was not necessary to use control measures in the dark fire-cured area of Tennessee.

POTATO FLEA BEETLE

Probably because of the extremely cold winter and the prolonged period of cold and rain in the spring and early summer, the potato flea beetle (Epitrix cucumeris Harr.) was relatively scarce in tobacco fields of the Connecticut River Valley until the first week in July. This is usually the approximate date of the beginning of second-brood emergence. In 1940 the beetles did not reach normal abundance until just before the later harvest in the first weeks of August. Thereafter they disappeared rapidly.

VEGETABLE WEEVIL

The vegetable weevil, which first attacked tobacco plants in the seedbeds at Quincy, Fla., in 1937, has continued to infest the beds each season. The infestation in 1940 was of moderate intensity but the larvae were sufficiently abundant to require control remedies in numerous instances. (F. S. Chamberlin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Larvae of the vegetable weevil were found feeding on small tobacco plants in plant beds in Florence County, S. C., on April 2. Later, adults and larvae were collected in plant beds and a number of the larvae produced adults. This was the first known occurrence of this pest on flue-cured tobacco. (N. Allen, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

TOBACCO THRIPS

The tobacco thrips did not appear in any numbers in the tobacco fields of the Connecticut River Valley until early in July. As usual, individuals could be observed on tobacco plants within a short time after the plants were set, especially on those near grass borders. Populations and damage were less than usual, however, until immediately prior to the harvesting of the crop. Unusually dry weather at this time enabled the thrips to cause somewhat more than normal injury in some fields. (A. W. Morrill, Jr., Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Spring infestations of Frankliniella fusca Hinds appeared to be about normal in the Florida-Georgia tobacco district, but the later generations were of small proportions, owing to the abundant rains. Thrips injury, which is confined to shade-grown tobacco, was of little economic importance this year. (F. S. Chamberlin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BOLL WEEVIL

The cycle of comparatively small loss caused by the boll weevil during the last several years continued in 1940 along the Atlantic seaboard but changed upward in other sections. Light defoliations by the cotton leaf worm allowed weevils to continue developing late in the season and above-normal numbers to enter hibernation in the fall of 1939. However, the expected heavy carry-over of weevils into 1940 was fortunately checked by the unusually low temperatures during January. At Tallulah, La., there were freezing temperatures for 20 successive days and a minimum of -8° F. was the coldest ever recorded at that locality. Practically all weevils hibernating in Spanish moss, cornstalks, and similar open shelter were killed. The emergence in hibernation cages was only 0.01 percent, the lowest ever recorded. No live weevils were found in the spring examination of Spanish moss collected from woods near cottonfields in several sections of the State. At Florence, S. C., with a minimum temperature of 13° F., the survival was 0.08 percent. Lower temperatures and survival occurred at Florence in 1936. The survival in cages at Leesburg, Fla., was 11 percent, and at Waco, Tex., 0.09 percent. Previous records are not available for comparison at the latter places. However, weevils hibernating in surface trash were protected from the cold by a heavy covering of snow over a large part of the Cotton Belt, and examinations of woods trash from near cottonfields showed that weevils had survived in protected places. Trash examination at Tallulah showed an average of 2,243 weevils per acre in the fall of 1939 and 190 in the spring of 1940, or a survival of 8.5 percent, as compared with 15 percent in 1939. Similar examinations at Florence in the spring of 1940 showed 176 live weevils per acre, in comparison with 3,582 in 1939. In general, the unusually cold weather reduced the weevil carry-over in 1940 to the lowest point in many years, and damage continued to be very light in North Carolina, South Carolina, Georgia, Florida, and parts of Alabama and Mississippi. In other sections of Alabama, Mississippi, and Texas unseasonably heavy rains retarded the cotton crop and, despite the light carry-over, heavy populations of weevils developed late in the season and caused severe damage. At Tallulah, La., the increased yields from plots dusted with calcium arsenate for weevil control was 54.7 percent, or the greatest since 1926, when it was 68.3 percent.

In the nearby Delata section of Mississippi the damage caused by weevils was much below normal. Damage was also light in southeastern Texas, but a long period of rainy weather during June and July was favorable for rapid multiplication and unusually heavy damage was caused in the blackland area of eastern and central Texas. At Waco, Tex., the yield was more than doubled in many of the experimental plots where weevils were controlled. In the lightly infested area an abundance of food late in the season allowed weevils to continue increasing until frost and to enter hibernation in excellent conditions; hence, in most sections the number of weevils entering hibernation in the fall of 1940 was above average. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

COTTON LEAF WORM

The cotton leaf worm situation in 1940 was characterized by the extremely slow and erratic spread of the insect and the small amount of damage it caused. The first leaf worms of the season were found in Cameron County, Tex., near Brownsville, on May 27, 1940, or about the normal time. It was reported from Calhoun County, in southeastern Texas, on July 31; from Marana, Pima County, Ariz., on August 5; from Burleson and McLennan Counties, in central Texas, on August 6; and from Presidio County, in western Texas, on August 10. A separate invasion of moths occurred in Florida as half-grown worms were found near Trenton, Gilchrist County, in the north-central part of the State on June 18, the earliest date recorded in many years. It is also of interest that the first appearance of leaf worms in Florida has been reported from the vicinity of Trenton over a period of years. Spread from this area was also slow. Infestations were reported from Valdosta, Lowndes County, southern Georgia, on July 31 from George County, in the Gulf coast region of Mississippi, on August 1; from Tallulah, Madison Parish, northeastern Louisiana, on August 15; from Washington County, in the Mississippi Delta, on September 28; and from Florence County, S. C., late in October. The leaf worm did not become sufficiently abundant to cause noticeable damage in any section, and for the first time in many years practically no control measures were necessary in 1940. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

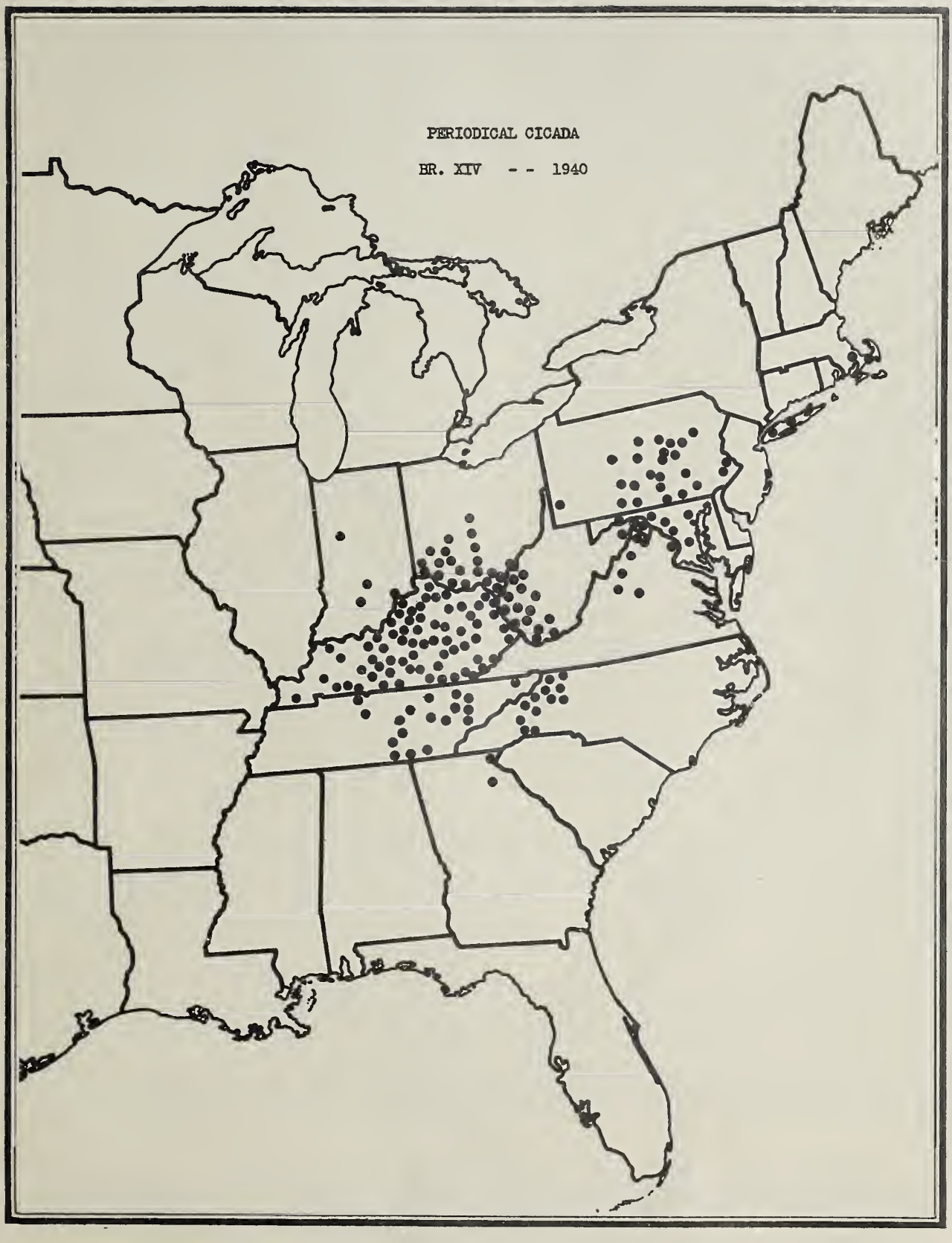
PERIODICAL CICADA

Brood XIV of the periodical cicada occurred over much of the territory from which it has been previously recorded. The old records from Illinois and New Jersey were not confirmed. Neither were several others, particularly those around the edge of the area of great abundance. The records for 1940 are as follows, the counties being underscored:

Alabama: Etowah, Attalla (5 mi. north); Jackson, Woodville.

Indiana: (Southern half of State as far north as La Fayette); Brown; Jefferson Madison; Lawrence; Tippecanoe, La Fayette.

Kentucky: Adair (entire county), Columbia, Glens Fork; Allen (entire county), Holland, Scottsville; Anderson (entire county), Alton, Glensboro, Lawrenceburg Barren, Cave City, Glasgow; Bell (entire county), Frakes, Jenson, Middlesboro Pineville; Boyd (entire county), Ashland, Catlettsburg; Boyle, Danville;


PERIODICAL CICADA
BR. XIV -- 1940

Bracken (entire county), Brooksville; Breathitt (entire county), Curt, Jackson Breckenridge, Cloverport, Blendean, McDaniels, Mystic; Bullitt, Shepherdsville Butler, Morgantown; Caldwell, Princeton; Campbell, Newport; Carter (entire county), Grayson, Hitchins; Christian, Hopkinsville; Clark, Wades Mill, Winchester; Edmonson, Brownsville, Chalybeate; Elliott (entire county), Sandy Hook; Estill (entire county), Irvine, Ravenna; Fayette; Franklin, Frankfort; Garrard (eastern and southern); Grant (southern half); Graves, Mayfield. (5 miles east); Grayson (entire county), Big Clifty, Clarkson, Caneyville; Green (entire county), Exie, Greensburg, Gresham, Newt, Summersville; Greenup (enti county), Greenup; Hardin (entire county), Summit, Upton; Harlan (entire count Cumberland; Hart, Cash, Linwood; Henderson, Anthoston, Niagara; Henry (wester half), Campbellsburg, Franklinton, New Castle; Jackson (entire county), Foxtown; Jefferson (eastern and southern), Cedar Grove near Buechel, Louisville, Okolona; Johnson, Paintsville; Kenton, Erlanger, Independence; Knox (entire county), Barbourville; Larue (entire county), Hodgenville; Lawrence, Louisa; Leslie (entire county), Hoskinston, Hyden, Stinnett; Letcher (entire county), Roxana, Sergent, Whitesburg; Logan, Lewisburg, Russellville; McCreary, Cumberland Falls, Pine Knot, Revelo; McLean, Livermore; Madison (entire county), Richmond; Marion (entire county), Lebanon, Loretto; Martin (entire county), Beauty, Inez, Stidham, Warfield; Mason (entire county), Maysville; Meade, Brandenburg; Mercer, McAfee; Metcalfe, Edmonton, Summer Shade; Monroe (entire county), Fountain Run; Morgan, Ezel, Mize; Nelson, Bardstown, Boston; Nicholas (northwestern); Oldham, Ballardsville; Owen (southern half); Owsley (entire county), Booneville; Pendleton (southern half); Perry (entire county), Hazard; Pike (entire county), Carmen, Meta, Virgie, Zebulon; Powell (entire county), Stanton; Pulaski (entire county), Somerset; Robertson (entire county), Mount Olivet; Rockcastle (entire county), Broadhead, Wildie; Rowan (entire county), Farmers; Russell (entire county), Creelsboro, Jamestown; Shelby, Peytonia, Shelbyville; Simpson, Franklin; Spencer, Taylorsville, Rivals; Taylor (entire county), Campbellsville; Todd, Allegre, Trenton; Trimble, Bedford, Milton; Warren, Bowling Green; Washington, Springfield; Wayne (entire county), Frazer, Mill Springs; Whitley (entire county), Walden, Williamsburg, Youngs Creek.

Maryland: (On boundary line between Allegany and Washington Counties); Allegany (Sideling Hill, Tonoloway Hill), Cumberland; Baltimore; Baltimore City, Baltimore; Frederick, (Catoctin Mountains), Frederick, Lewistown (3 miles west); Montgomery, Ashton, Silver Spring (Avenal, 4 miles east, and Woodside, 1 mile north); Prince Georges, Beltsville, Berwyn, College Park, Laurel; Washington.

Massachusetts: Barnstable (both sides of Cape Cod Canal at the end of Cape Cod, Bourne, Bournedale, Cataumet, Centerville, Cotuit, East Falmouth, Falmouth, Hyannis, Mashpee, Osterville; Plymouth, Manomet, Plymouth.

New York: Nassau, Bethpage, Farmingdale, Hicksville; Suffolk, Cold Spring Harbor, Commack, Deer Park, Eastport, Huntington, Manorville, Northport, Saint James, Wyandanch.

North Carolina: On the Madison-Yancey County line. Alexander; Alleghany; Avery, Altamont; Buncombe, Asheville; Burke (northwestern, in vicinity of Ashford, McDowell County); Caldwell; Watauga; Wilkes.

Ohio: Adams; Brown, Ripley; Butler; Clermont; Clarke; Clinton; Delaware; Franklin, Columbus (10 miles north); Gallia; Greene, Clifton; Hamilton; Highland; Jackson, Oak Hill; Lawrence, Burlington, Chesapeake, Coal Grove, Hanging Rock, Ironton, North Kenova, Proctorville, South Point, Sybene; Meigs; Montgomery; Pickaway; Pike, Piketon, Sargents, Wakefield; Ross, Chillicothe; Scioto, Franklin Furnace, Haverhill, Lucasville, New Boston, Portsmouth (15 miles northwest in Shawnee forest), Wheelersburg; Warren.

Pennsylvania: Adams, Arendtsville, Bendersville, Biglerville, Flora Dale, Gettysburg, Idaville, Orrtanna, townships of Berwick, Butler, Huntington, Latimore, Menallen, Tyrone; Bedford, Alum Bank, Bedford (also 10 miles nort east), Breezewood, Buffalo Mills; Blair, Altoona, Bellwood, Canoe Creek, Martinsburg, Tyrone, Williamsburg, townships of Alleghany, Antis, Catherine Frankstown, Juniata, Logan, Snyder, Tyrone, Woodbury; Berks, Bernville, Mount Penn, Reading, townships of Brecknock, Caernarvon, Robeson, Union; Bucks, Pleasant Valley, Quakertown, Sellersville; Cambria (northeastern); Centre (entire county), Bellefonte, Centre Hall, Fleming, Mill Hall, Milroy, Philipsburg, Port Matilda, Snow Shoe, State College, Unionville; Chester, Compass, townships of East Brandywine, Highland, Uwchlan, Upper Uwchlan, West Brandywine, West Caln, West Nantmeal, West Sadsbury; Clearfield, Bridgeport, Clearfield, Curwensville, Frenchville, Hawk Run, Karthaus, Lanse, Lumber, Munson, Woodland, townships of Bradford, Cooper, Covington, Girard, Goshen, Karthaus, Lawrence, Morris, Pike; Clinton, Beech Creek, Lock Haven, Loganton, Renovo, townships of Allison, Bald Eagle, Beech Creek, Castanea, Chapman, Colebrook, Crawford, Dunnstable, Gallaher, Grogan, Green, West Keating, East Keating, Lamar, Leidy, Logan, Noyes, Pinecreek, Porter, Woodward, Wayne; Columbia (entire county), Bloomsburg, Buckhorn, Mill Grove, townships of Benton, Bloom, Beaver, Briar Creek, Catawissa, Center, Cleveland, Conyngham, Fishing Creek, Franklin, Greenwood, Hemlock, Jackson, Locust, Madison, Maine, Mifflin, Montour, Mount Pleasant, Orange, Pine, Roaring Creek, Scott, Sugarloaf; Cumberland, Carlisle, Mount Holly Springs, Newburg, townships of Dickinson, Goodyear, Penn; Dauphin, Inglenook, townships of Reed, Halifax, Middle Paxton, Upper Paxton, Susquehanna; Franklin, Blackgap, Caledonia, Pen Mar, townships of Antrim, Greene, Guilford, Quincy, Washington; Fulton, Amaranth, Needmore, Warfordsburg; Huntingdon (along William Penn highway), Alexandria, Centre Union, Huntingdon, McAlevys Fort, Petersburg, Todd, Union Church, Union Furnace, townships of Barree, Brady, Carbon, Dublin, Franklin, Henderson, Jackson, Juniata, Logan, Miller, Morris Oneida, Porter, Shirley, Smithfield, Spruce Creek, Todd, Union, Walker, Warriors Mark, West; Juniata, Cocolamus, Mifflintown, townships of Fayette, Fermanagh, Greenwood, Monroe; Lancaster, Brickerville (along highway 322 to Lebanon County line), Gap (at Chester-Lancaster County line); Lackawanna, Jermyn, township of Scott; Lebanon, Millbach, Newmanstown, townships of Cornwall, Heidelberg, Londonderry, Mill Creek, South Annville, West Cornwall; Lehigh, Slatington, Zionsville; Luzerne, Hazleton, Kyttle, Laflin, Laurel Run, Wilkes-Barre, townships of Bear Creek, Dennison, Fairmount, Hanover, Plains; Lycoming (entire county), Marsh Hill, Williamsport, townships of Anthony, Armstrong, Brady, Brown, Cascade, Clinton, Cogan House, Cummings, Eldred, Fairfield, Franklin, Gamble, Hepburn, Jackson, Jordon, Lewis, Limestone, Loyalsock, Lycoming, McHenry, McIntyre, McNett, Mifflin, Mill Creek, Moreland, Muncy, Muncy Creek, Nippenose, Old Lycoming, Penn, Piatt, Pine, Plunketts Creek, Porter, Shrewsbury, Susquehanna, Upper Fair-

field, Watson, Washington, Wolf, Woodward; Mifflin, Allensville, Belleville, Lewistown, Milroy, Newton, Hamilton, Yeagertown, townships of Armagh, Bratton, Brown, Decatur, Derry, Granville, Menno, Oliver, Union, Wayne; Montour (entire county), Danville, Washingtonville, townships of Anthony, Cooper, Derry, Limestone, Liberty, Valley, West Hemlock, Mahoning, Mayberry; Northumberland (entire county), Milton, Mount Carmel, Northumberland, Paxinos, Potts Grove, Shamokin, Sunbury, townships of Coal, Delaware, East Cameron, East Chillisquaque, Gearhart, Jackson, Jordan, Lewis, Little Mahanoy, Lower Augusta, Lower Mahanoy, Mount Carmel, Point, Ralpho, Rockefeller, Rush, Shamokin, Turbot, Upper Augusta, Upper Mahanoy, Washington, West Cameron, West Chillisquaque, Zerbe; Perry (on Blue Mountain from Marysville at the Susquehanna River to Starrets Gap), Duncannon, Elliottsburg, Liverpool, Marysville, New Bloomfield, Newport, Shermans Dale, townships of Buffalo, Carroll, Center, Greenwood, Howe, Liverpool, Miller, Oliver, Penn, Rye Spring; Schuylkill, Shenpton, townships of Barry, Butler, Branch, Cass, Hegins, Hubley, Union; Snyder, Beavertown, Freeburg, Middleburg, Port Trevorton, Rolling Green Park, Selinsgrove, Shamokin Dam, Troxelville, townships of Adams, Beaver, Center, Chapman, Franklin, Jackson, Middlecreek, Monroe, Penn, Perry, Spring, Union, Washington, West Beaver, West Perry; Union, Allenwood, Buffal Valley, Hartleton, Lewisburg, Mifflinburg, Millmont, New Berlin, New Columbi Winfield, townships of Buffalo, East Buffalo, Gregg, Hartley, Kelly, Lewis, Limestone, Union, West Buffalo, White Deer; York, Dillsburg, Dover, Hanover, Hellan, Mount Wolf, Woodbine, York (10 mi. west), townships of Conewago, East Manchester (Conewago Hills), Hellam, Paradise.

Tennessee: Anderson; Blount (Chilhowee Mountain); Campbell; Coffee; Cumberland; Davidson; De Kalb; Fentress; Franklin; Hamilton (along U. S. Highway 27, from Sale Creek to the Rhea County line); Knox (in area between Knoxville and Norris Dam); Marion, Martin Springs; Montgomery, Clarksville; Putnam, Cookeville; Roane; Robertson, Springfield; Sullivan, Bristol; Union, Maynardville; Warren.

Virginia: Albemarle, Crozet; Augusta, Churchville, Staunton, Stuarts Draft, Waynesboro; Clarke; Fairfax, El-Nido, Vienna; Frederick, Gore; Rockingham, Timberville; Shenandoah.

West Virginia: Berkeley, Gerrardstown, Glengary; Boone; Cabell; Jackson; Kanawha, Charleston; Lincoln; Logan; McDowell; Mason; Mercer; Mingo; Putnam; Wayne; Wyoming.

EASTERN HEMLOCK BORER

Examination of the root systems of 30 hemlock trees in stands on the Menominee Indian Reservation, washed out in 1939 and 1940, has conclusively shown that the eastern hemlock borer (Melanophila fulvoguttata Harr.) can successfully attack eastern hemlock only when the trees are definitely dying from other causes. Therefore this borer should be considered as a secondary insect. The succession of consecutive drought years in this region from 1930 to 1937 was the primary cause of the heavy hemlock mortality in these stands. There was a noticeable reduction in the abundance of the beetles in 1940 for the first time since the study was started in 1937. This is apparently be-

cause the very favorable growing seasons of 1938 and 1939 caused a resumption of vigorous growth. In a group of experimental plots having a total acreage of 16 acres, the average tree mortality has dropped from 15.4 percent by volume in board feet in 1938 to 5.9 percent in 1939 and to 0.6 percent in 1940. Because of the excellent growing season of 1940, it is expected that this reduction of mortality will be continued in 1941 and that the beetles will be even less abundant than in 1940.

SPRUCE BUDWORM

Infestations in jack pine stands on the Chippewa National Forest in northern Minnesota declined in 1940, and defoliation was not noticeable in any of the ranger districts. The precipitation was above normal and there was a great improvement in stands that were heavily defoliated in 1938. The 1940 foliage was very vigorous, and many of the trees which were weakened by drough as well as by defoliation in the upper part of the crown appeared to be recove ing. (H. J. MacAloney, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SMALLER EUROPEAN ELM BARK BEETLE

State workers in New Hampshire have supplied a number of distribution records for the lower third of that State. They report having taken the speci as far north as Franklin and Gilmanton and as far west as Richmond. State and Government workers have found it in a number of additional towns in northwestern Connecticut, southwestern Massachusetts, southeastern New York, and northeastern Pennsylvania, which extend the limits of the known infested area that radiates from New York City. (C. W. Collins, Bureau of Entomology and Pl Quarantine, U. S. D. A.)

MOUNTAIN PINE BEETLE

Surveys of white pine stands within the Inland Empire show an annual loss of 91,000,000 board feet of valuable timber resulting from the attacks of the mountain pine beetle. This loss, which is one-fourth of the volume cut for lumber, is being reduced by the practice of treating all centers, or "hot spots," of infestation, which has apparently prevented the development of severe epidemic outbreaks. There are two potentially dangerous areas of infestation in the white pine stands of northern Idaho for which control measures have been recommended. Although this insect continues its destructiveness in the whitebark pine stands of the northern Rocky Mountains, there are only light losses within the lodgepole pine stands of the same area. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

WESTERN PINE BEETLE

Throughout the ponderosa pine stands of central Idaho and Montana the western pine beetle (Dendroctonus brevicomis Lec.) continues to take a fairly constant annual toll of approximately 0.6 percent of the total volume. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

During 1940 the losses caused by the western pine beetle (Dendroctonus brevicomis Lec.) in Oregon and Washington continued on an upward trend from th low point reached in 1937. The tentative 1940 loss figure for the ponderosa pine stands in the two States has been set at 520 million board feet, as compared with 470 million in 1939 and 380 million in 1937. In certain areas in Oregon these losses assumed epidemic proportions and necessitated direct control measures. Control projects were approved and were started on the Fremont and Malheur National Forests. On the Deschutes National Forest, the Warm Springs Indian Reservation, and certain private lands in southern Oregon maintenance control work was again undertaken. (F. P. Keen, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

During 1940 heavy infestations of ponderosa pine stands were local, rather than general, throughout California. In the northeastern part of the State group kills continued through the summer, but overwintering broods in most areas will be found chiefly as single tree infestations in which large trees are involved. Notwithstanding the lack of spectacular epidemic infestation, fall surveys show that most of the current loss, which amounts to between 75 and 100 board feet per acre in northern California, remains heavy and averages about the same as in 1939. In the stands in the coast and Sierra ranges the loss is considerably less; however, in central and southern California endemic infestations are of sufficient importance to necessitate maintenance control projects in valuable recreational centers. (J. M. Miller, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

DOUGLAS FIR BEETLE

The widespread outbreak of the Douglas fir beetle (Dendroctonus pseudotsugae Hopk.) continues without any noticeable abatement throughout the northern Rocky Mountain region. This infestation is so extensive that control is prohibitive, aside from areas where timber stands have a high commercial or aesthetic value. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Only three minor outbreaks of the Douglas fir beetle (Dendroctonus pseudotsugae Hopk.) in Oregon and Washington were reported in 1940. Two of these outbreaks were in Oregon in fire-scorched trees adjacent to recent burns, and one outbreak was in Mount Rainier National Park, Wash. In the Rocky Mountain region the Douglas fir beetle continued to cause widespread destruction of Douglas fir. Losses caused by this insect continued at a high level in the forests of Wyoming, Colorado, and Utah. At the end of the year there were no marked signs indicating a subsidence of the current infestation. (F. P. Keen, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BLACK HILLS BEETLE

Infestation by the Black Hills beetle (Dendroctonus ponderosae Hopk.) in the pine stands of Colorado and southern Wyoming continued to show a marked decrease from the epidemic conditions of recent years. This decrease first became evident in 1939 following an intensive control program on private, State, and Federal lands. At present the infestation has been so reduced that only a few small clean-up projects are necessary during the 1940-41 season.

These will be carried out on the Black Hills, Medicine Bow, Roosevelt, and Pike National Forests. In Utah the current infestation is considerably more aggressive. Treatment of approximately 17,000 infested ponderosa pines on the Powell National Forest during the winter of 1939-40 caused a 92-percent reduction on the treated area. A residual infestation of 6,000 trees chiefly on the untreated areas remains to be treated this winter. On the Wasatch National Forest the current Black Hills beetle infestation in lodgepole pine stands has reached epidemic proportions. An extensive control program is being conducted against this infestation and it is hoped that by spring the areas of heaviest concentration will have been covered. (F. P. Keen, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

JEFFREY PINE BEETLE

Throughout the Jeffrey pine stands of northeastern California surveys showed a marked increase in loss resulting from current infestations by the Jeffrey pine beetle. A considerable portion of the 124 board-foot-per-acre loss in the Lassen Forest and over half the 200 board-foot-per-acre loss cruised on the Plumas Forest area was loss in Jeffrey pine. In spite of this activity, surveys of the Mono and Inyo stands to the south show very little activity and loss. (J. M. Miller, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ENGELMANN SPRUCE BEETLE

The sudden epidemic flare-up of the Engelmann spruce beetle (Dendroctonus engelmanni Hopk.) which occurred some 4 years ago and resulted in a tremendous destruction of spruce within the Yellowstone National Park and other areas, has decreased materially in severity. Although there are a few scattered light infestations of this insect within the northern Rocky Mountains, the epidemic has died down, owing in many areas to the lack of host material. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ENGRAVER BEETLE

The Oregon pine engraver (Ips oregoni Eichh.) continues its spot killing of small areas of ponderosa pine reproduction and small trees throughout the Inland Empire. These small flare-up infestations are in most cases associated with sporadic logging or wood-cutting operations. Such outbreaks are short-lived and control measures are seldom necessary. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

DOUGLAS FIR TUSSOCK MOTH

The outbreak of the Douglas fir tussock moth (Henerocampa pseudotsugata McD.), which during the last few years destroyed some rather large patches of Douglas fir within the Sawtooth National Forest, has decreased to where no visible defoliation has occurred during the last two seasons. Associated with the Douglas fir tussock moth during this outbreak were large numbers of a geometrid defoliator, Nepytia canosaria var. Wlk. The combined feeding of these two species of insects resulted in a complete defoliation of the trees. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EUROPEAN SPRUCE SAWFLY

The outstanding feature affecting the European spruce sawfly situation in the United States during 1940 has been the widespread and general mortality of larvae caused by "disease." The infestation in the severely defoliated areas of southern Vermont and southern New Hampshire has been reduced to a very low point. In many areas where there was a high population of overwintering cocoons during 1939-40, and where heavy defoliation was expected in 1940, ther was only slight feeding. Owing to the relatively low percentage of cocoons remaining in diapause in these sections, there is now a very low population of living cocoons in hibernation and most of those present are found on the outskirts of the areas formerly affected severely. There has been a considerable mortality of pasture spruce and spruce growing in rather open growth in southern Vermont, but in closed stands mortality has been comparatively low. Severest mortality has apparently followed the 1938 feeding, and this may have been caused in part by the exceptionally dry season of 1939. The presence of larval disease was noted at a number of places in Maine in September, and very few living larvae could be found at points visited. On the other hand there is a considerable holdover of cocoons in Maine and, therefore, a considerable population of living cocoons in hibernation at many places. It is expected that adults will emerge from many of these cocoons next spring. Whether disease will affect the larvae next year is problematical. A number of severely infested trees near the mouth of the Allagash River at East Twin Brook have died. Notwithstanding the prevalence of larval "disease" and the reduction in infestation in the general area, some places have shown an increase in infestation and have light to medium infestations at the present time. These include Mt. Cornell in the Catskills of New York; Green Peak, Mt. Equinox, and Mt. Abraham, in Vermont; North Pack Monadnock, Crotched Mountain, Bald Peak, and Deer Mountain, in New Hampshire. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

A PINE SAWFLY

Gilpinia frutetorum F. is an introduction from Europe and apparently has been established in North America for many years, as it is now known to occur in the States of Connecticut, Massachusetts, New Hampshire, New Jersey, and New York and in a few localities in Ontario, Canada. Until recently it had never attracted any attention in this country. Observations made in 1939 and 1940 indicate that this species is increasing in some localities in New England and New York, although as yet it is not abundant enough to have caused serious defoliation. The larvae feed on red and Scotch pine. They are solitary in habit and their color blends with that of the pine foliage, so they are easily overlooked unless rather abundant. There is one generation and at least a partial second generation each year in New England. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

LECONTE'S SAWFLY

Observations made and reports received indicate that Neodiprion lecontei Fitch was more prevalent in 1940 than usual in many localities in New England and New York. It rarely, if ever, causes extensive defoliation in natural stands, usually attacking a single pine tree or groups of trees growing more

or less in the open; however, it is a serious pest in pine plantations. One observer reported that a red pine plantation of 20 acres in Franklin County, N. Y., was entirely ruined during the last 2 years by this insect. Some serious defoliation in pine plantations was also reported in several counties in northern New York, and in Bennington County, Vt.

A RED PINE SAWFLY

An undescribed species of Neodiprion has been causing considerable concern to owners of red pine plantations in rather widely separated localities in New Hampshire, Vermont, and Massachusetts since 1935. It caused some serious defoliation in the spring of 1940 in a few plantations in Massachusetts, New Hampshire, and New York, and in one natural stand of red pine at Groton, Mass. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

LARCH SAWFLY

The outbreak of the eastern larch sawfly (Nematus (Lygaeonematus) erichsonii Hartig), which appeared near the Canadian border in the Blackfeet National Forest in 1933, has spread southward. Last season infested areas were recorded on the Coeur d'Alene National Forest, where the defoliation was quite severe. (J. C. Evenden, Bureau of Entomology and Plant Quarantine, U. S. D. A.

FOREST TENT CATERPILLAR

Observations made and reports received in 1940 indicate that the outbreak, which has been rampant throughout the southern half of Vermont and the western part of Massachusetts since 1935, has now subsided. The defoliation in 1940 has been rather light and the infestations extremely local, except in an area in western Massachusetts near the New York line, where the feeding was rather heavy over a considerable area, particularly in the town of Richmond. Reports from New York indicate that severe defoliation occurred in Madison, Chenango, Otsego, Delaware, Sullivan, and Broome Counties. Many areas in woodlands and maple groves ranging from about 5 to 100 acres or more in extent were from 75 to 90 percent defoliated. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

TENT CATERPILLARS

Outbreaks were widespread in Oregon during 1940. Defoliations were reported on many broad-leaved tree species, including alder, willow, poplar, cherry, and apple. (F. P. Keen, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

An epidemic of Malacosoma fragilis (Stretch) on bitterbrush (Purshia tridentata) on the Deschutes National Forest, Oreg., reported in 1939 was brought under control by natural factors. In 1940 there was little evidence of the severe defoliation which has characterized the infested area during the last 2 years. (F. P. Keen, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SADDLED PROMINENT

Various reports received indicate that the larvae of this species were locally abundant in the White Mountain area of New Hampshire, the counties of Windham and Rutland, Vt., and the Catskill Mountain area in New York. A stand of maple and beech covering an area of between 1 and 2 square miles on Herrick Mountain in Rutland County, Vt., was heavily defoliated in July 1940. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BEECH SCALE

An examination made in September 1940 of permanent sample plots located in eastern and central Maine revealed a slight decrease in intensity of infestation. However, reports from north-central Maine indicate very heavy infestation of the scale and infection with Nectria, a fungus which follows the scale. No appreciable increase in severity was observed in the infestation at Bartlett, N. H., in the White Mountain region. This insect is now generally distributed throughout Westchester County, N. Y., and has been found west of the Hudson River. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

GYPSY MOTH

The hatch of gypsy moth egg clusters in 1940 was somewhat varied, especially in Vermont, ranging from 51 to 82 percent, with an average of 69 percent; in Massachusetts the average hatch was 90 percent; in Connecticut, 96 percent. Winter-killing of egg clusters was light. Hatching was late, but late spring mortality was pronounced. In Maine there was a slight increase in defoliation in 1940, over that recorded in 1939. In New Hampshire there was an increase of 16,000 acres, located around Concord and north to Lake Winnepesaukee. In Vermont there was a considerable decrease, all gradations of defoliation being less than in 1939. In Massachusetts there was about a 10-percent decrease in total defoliation from that recorded in 1939. In Barnstable, Hampshire, Franklin, and Hampden Counties there was a large decrease in the number of acres showing defoliation. In Hampshire, Franklin, and Hampden Counties no 100-percent defoliation was recorded. In Norfolk and Worcester Counties there was a slight decrease, and in Bristol, Middlesex, and Plymouth Counties a considerable increase. A slight increase was recorded in Dukes and Essex Counties, and no defoliation reported from Berkshire, Nantucket, and Suffolk Counties. In Rhode Island there was a decrease of over 90 percent in total defoliation from that recorded in 1939. In Connecticut no noticeable defoliation was recorded in 1940. (A. F. Burgess, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Parasetigena silvestris R. D. is a valuable larval parasite of the gypsy moth in Central Europe, commonly destroying 35 percent of this insect when it occurs under epidemic conditions. This parasite was, over a period of years, imported and liberated in 22 towns in New England. For the first time, in the summer of 1940, it was recovered in several localities in Massachusetts in such encouraging numbers as to indicate that it ultimately should be an excellent addition to the sequence of gypsy moth parasites already established in this country. (R. C. Brown, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BROWN-TAIL MOTH

During the summer of 1940 there were a few reports of defoliation by this insect. In south-central and southeastern New Hampshire there were several localities where apple orchards and elms were completely defoliated. Some defoliation was also reported from Maine. According to reports received from Maine, New Hampshire, and Massachusetts, the total number of brown-tail moth webs cut by State or local authorities during the winter of 1939-40 was considerably greater in Maine and New Hampshire and less in Massachusetts. In Maine the number increased from 974,000 in 1938-39 to 1,469,000 in 1939-40. In New Hampshire, with about the same number of men working, 515,000 webs were cut in 1939-40, as compared with 117,000 cut in the winter of 1938-39. In Massachusetts the number of webs cut in 1939-40 decreased considerably. During this time 254,000 webs were cut, whereas in 1938-39 a total of 644,000 webs were destroyed. (A. F. Burgess, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SCREWWORMS

Adult activity in Texas, as indicated by status and survey traps (48 traps) was 50 percent or more below normal for January and February 1940 in all of the overwintering area. Winter survival was approximately normal on the western Balcones Escarpment and much below normal on the Rio Grande and Gulf Plains. No overwintering was indicated on the eastern Balcones Escarpment. From March to the middle of May the build-up was much below normal and increase in abundance was slight. An unusual increase of adults occurred the latter part of May, and the population over all the western Balcones Escarpment was above normal from June to September, and above normal on the eastern Balcones Escarpment and on the Edwards Plateau during August and September. In all of these northern areas the October and November increase was marked, and the adult activity was below normal. At the end of 1940 the usual late December increase was indicated on the west-south escarpment. Over the Rio Grande and Gulf Plains the fly populations have been very low during the entire year, excepting the Laredo-Rio Grande City area which has had a marked increase in adults during November. Migration of the fly into central Texas and Oklahoma was at the usual rate of spread; that is, the fly reached central Texas soon after May 1 and was in southern Oklahoma after approximately June 1. Reports from Jackson and Vicksburg, Miss., and from Tallulah and Shreveport, La., indicated that the fly had not reached these places early in September. Some cases were reported at Palestine, Tex., in August and early in September. Reports from Arizona indicated the fly to be normal or above normal in activity. A survey in California (Sept. 19-30) indicated the fly to be abnormally abundant over the southern part of the State and as far north as Redding, in the Sacramento Valley. The first known positive identification in Lake County was recorded late in September. The winter was abnormally mild in California and the early spring floods in the upper Sacramento Valley were conducive to the outbreak. (D. C. Parman and W. L. Barrett, Jr., Bureau of Entomology and Plant Quarantine, U. S. D. A.)

County agents of Florida reported that screwworm cases were less plentiful during 1940 than during any preceding year since the pest became established in the Southeast. Localized cases were reported in Escambia, Holmes, and

Gadsden Counties, of western Florida, and in Madison, Taylor, Hamilton, and Nassau Counties, of northern Florida. During September and October a high incidence occurred in the vicinity of Starke, Palatka, and St. Augustine, Fla., and along the west coast another endemic area extended from Dunnellon southward to Punta Gorda. County agricultural agents were of the opinion that most of the cases in the two principal foci developed in hogs which roamed the woods and that bites caused by the Gulf coast tick were the principal predisposing causes. (W. D. Dove, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

I believe the screwworms were worse in 1940 than they have been since 1935, the year in which they were so severe. The infestation was general over most of the State but not so severe as it was in some of the Southern States. In the weekly county agents' reports on conditions on livestock, they did not report any loss because of screwworms. (C. F. Stiles, extension entomologist, Stillwater, Okla.)

Weather conditions have been very mild in Arizona for 3 years; consequently there has been little or no destruction of these flies. Last year screwworms infested susceptible wounds during each month. Probably our worst season was during October, November, and December. This year they have been bad during the summer and fall. Many stock men report that this has been the worst year of their experience. (W. J. Pistor, University of Arizona.)

STABLEFLY

In the Southwest the stablefly has been more abundant and has caused more injury during 1940 than at any other time during the last 4 years. Reports have been received from dairymen, livestock breeders, and feeders, and hog raisers that they have had an unusual amount of stablefly annoyance during the 1940 fly season. Complaints were common from residents of Dallas that they were driven indoors by the bites of stableflies and that pet dogs suffered sore ears as a result of the bites of these flies. Dairy cattle and especially young calves were severely annoyed, practically all year long. At times as many as 400 stableflies per animal were estimated during the late afternoon hours. The season was the longest ever noticed in the vicinity of Dallas. As late as the first week in December thousands of engorged adults were noticed on the walls and fences of calf barns and on the animals themselves in the vicinity of Dallas. In one instance during the first week in December calves were so annoyed that they sought shelter in fence corners or in dark places in the barns. The period of annoyance was approximately 8 months. (E. W. Laake, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

In northwestern Florida, where it is known as the "dog fly," there were no extensive outbreaks, and no deaths were reported from attacks from the flies. This was a distinct contrast to 1939 when it was reported that flies caused some tourists to leave the beaches. One stockman reported that in 1939 about 500 cattle, or one-fifth of the herd owned by him, became mired and died in the swamps where they were driven by the flies. Large but sporadic numbers of the flies appeared on beaches in 1940 from August 4 to 6, from September 5 to 15, from December 10 to 15, and from December 20 to 27. The abundance of the flies in September coincided with the emergence of adults from nearby marine grass deposits on beaches. The occurrences in December when there was

no marine grass for breeding, coincided with the emergence of outbreak numbers from peanut litter in fields of western Florida, southern Alabama, and southwestern Georgia. The emergence of December was followed by some cold weather which held the flies in check. The very strong circumstantial evidence of flight of flies from peanut fields to the beaches during December suggests that dog flies are capable of flying much farther than anticipated. It adds credence to reports of fishermen that dog flies appear as far as 75 to 100 miles off shore in sufficient numbers to annoy persons engaged in deep-sea fishing. (W. E. Dove, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

HORN FLIES

The abundance of horn flies on cattle in the Dallas-Fort Worth, Tex., area during 1940 was below the average for the last 4 years. This reduction in horn fly populations was due, primarily, to the prolonged drought last summer. Infestations of 3,500 to 4,000 flies per head were commonly observed on cattle in the previous 3 years, but in 1940 infestations seldom exceeded 3,000 flies per head. Horn flies were abundant on cattle in Jefferson County, Okla., in 1940. No data are available with which to compare this year's infestations with those of previous years; however, the county agent reports that horn flies were much more numerous and pestiferous in 1940 than for several years. Climatic conditions in Jefferson County were favorable for horn fly development because of the unusually frequent rains during the summer, which provided about 27 inches of moisture in 4 months. Horn fly infestations on cattle in the vicinity of Waurika, Okla., were estimated at 1,200 to 2,000 per head. In general, it may be stated that horn flies are usually abundant on cattle in the area from Dallas, Tex., west to Cresson, Tex., and north to Waurika, Okla. This area of horn fly abundance is, undoubtedly, more extensive and its limits have not been determined. (E. W. Laake, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

COMMON CATTLE GRUB

In the vicinity of Dallas, Tex., cattle grubs were more abundant, especially in dairy animals, during the 1940 season than during 1939. The number per animal in mid-December ranged from none to 50, with some cows in practically every herd having at least 20 grubs each. In northwestern Texas, where cattle grubs are always abundant, the population this year is approximately normal. The heaviest infestation, as usual, is encountered in the younger animals, many of which have over 20 and some over 30 grubs per head. In eastern Texas, where the cattle industry has expanded tremendously during the last few years, cattle grubs are apparently not so abundant as in northwestern Texas, but lightly to heavily infested animals are found in practically every herd. The appearance of cattle grubs in the backs of animals was apparently at the normal time in the northwestern Texas area, whereas in the vicinity of Dallas and especially in eastern Texas, it was from 2 weeks to 1 month later than usual. As a whole, the cattle grub situation is serious and causes a tremendous loss in flesh and milk and damage to hides. In the ranch country the running of animals by heel flies in the spring, when animals have just come out of the winter in a poor and weakened condition, has caused heavy damage, particularly to feeder stock. Stockmen from many counties in

north-central and northwestern Texas have asked for aid in the control of this important pest. In southern Oklahoma and in northwestern Texas considerable effort is being expended by county agents, dairymen, and ranchmen in an attempt to control cattle grubs by methods recommended by the Bureau, and many other livestock owners are using various commercial concoctions in an attempt to alleviate the cattle grub situation. (E. W. Laake, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

CLEAR LAKE GNAT

In the Lakeport and Nice area of California the Clear Lake gnat (Chaoborus astictopus D. & S.) was more numerous generally during 1940 than in 1939. Status traps took 32 percent more gnats in 1940 than in 1939. The gnat was reported as much less abundant and annoying at Lake Pillsbury, a small lake 30 miles north of Clear Lake, than for several years. (A. W. Lindquist, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SANDFLIES

Sandflies had the usual seasonal occurrence of Culicoides canithorax Hoff. during the spring and autumn months from grass-marsh areas, and the usual emergence of C. furens Poey from mangrove and pickleweed marshes. The latter reached its highest incidence of the year from January 15 to February 10, declined about half by April 15, and then reached another peak about June 15. By September 15 the pest was of little economic importance and remained with a low incidence from October 1 to December 31. Pyrethrum is being used more generally with satisfactory results in treating screens of windows of houses and for protecting the arms and faces of persons working in the vicinity of marshes. The disease of children, known in the Southeast as sandfly fever, has not been reported this season. (W. E. Dove, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

HUMAN FLEA

Specimens were submitted for the first time from West Virginia, where a heavily infested barn was reported at Fort Gay. (H. L. Trembley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

LONG-NOSED CATTLE LOUSE

Heavy infestations of Linognathus vituli are general, especially in young white-faced cattle in northwestern Texas. Ranchmen in some northwestern counties claim that 100 percent of their animals were infested in December 1940. Much dipping for the control of this louse is in progress in various western Texas counties. In the vicinity of Dallas, and also in eastern Texas, infestations are common, especially in the younger animals. The larger ranches in the eastern Texas area are also dipping their cattle extensively for the control of this louse. The general abundance of this louse during 1940 was, according to reports, somewhat above normal and considerable damage to young stock was reported. (E. W. Laake, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SHORT-NOSED CATTLE LOUSE

In northwestern Texas, particularly the Panhandle area, Haematopinus eurysternus Nitz. is exceedingly abundant on some individual range animals. As is usually the case with this insect, only certain animals, which for some unknown reason are more susceptible than others, are subject to tremendous infestations, whereas many in the same herd appear to be free of this pest. The infestation during 1940 was general but apparently no more severe than during previous years. (E. W. Laake, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

AMERICAN DOG TICK

In general, the American dog tick appeared to be normal, or slightly below in abundance in the Eastern States during 1940. In southeastern Massachusetts, however, ticks were much less numerous than during 1939, and, in some adjacent localities, fewer than they had been for many years. The isolated area of infestation around Lake Winnepesaukee, N. H., was found to have extended northward, the tick occurring apparently for the first time at a point a few miles south of Conway. Rocky Mountain spotted fever, which is transmitted by this tick in the Central and Eastern States, showed a distinct decrease, according to reports published by the United States Public Health Service in Public Health Reports. Through November a total of 232 cases were reported in 1940, as compared to 347 in 1939 and 242 in 1938. The disease was reported in 10 cases in Oklahoma in 1940 whereas in 1939 none had been reported west of Iowa and Missouri. The number of cases in the Western States, where the principal carrier is D. andersoni Stiles, showed a constant increase, from 118 in 1938, 169 in 1939, to 180 in 1940. (F. C. Bishopp, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

WINTER HORSE TICK

The problem of the winter horse tick (Dermacentor nigrolineatus (Pack.)) in Texas is principally confined to the thick brushy sections along the escarpment of the Edwards Plateau, although during some years trouble from this pest may extend well up on the plateau itself, along some of the valleys of the rivers which head farther north than the escarpment, and into the flat plains country south of the plateau. The ticks as a rule do not begin attacking animals until about the middle of November and continue until well into February. They cause considerable injury and death loss among horses, the principal host. Animals are infested over the entire body and it is not uncommon to see several thousand ticks on a single horse. In heavily infested animals serious symptoms are early apparent, notably the extensive swelling along the larger veins on the belly. This is followed by a rapid decline in the health of the animal and death frequently ensues if the ticks are not destroyed. During 1940 heavy infestations began to appear about the first of December in the eastern end of the escarpment area and subsequent reports from ranchmen indicate that considerable trouble is now being experienced all along the edge of the plateau and as far north as Sonora and Menard, Tex. Ranchmen report that the infestations are much heavier than in 1939 and that a number of animal have already died from the attacks of the tick. (E. C. Cushing, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BROWN DOG TICK

This tick is becoming more widely distributed each year. It was reported from many new localities and from four new States during 1940--Colorado, Minnesota, Nebraska, and Tennessee. (F. C. Bishopp, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

GULF COAST TICK

Throughout Florida, Gulf coast ticks were reported commonly from livestock in 1940, and some county agricultural agents state that this pest again served as a principal cause of screwworms along the west coast of the Florida Peninsula. The occurrence of large numbers of ticks on the ears of untreated hogs in the woods enables the pest to continue development of large numbers of ticks for infestations of different animals next year. (W. E. Dove, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EAR TICK

During 1940, the spinose ear tick increased to such proportions in the Edwards Plateau area of Texas that many ranchmen deemed it advisable to follow a systematic treatment of the ears of cattle to reduce the injury inflicted by screwworm infestations resulting from the attacks of the ticks. Although the tick attacks the ears of most species of domestic livestock, cattle appeare to suffer the greater injury during 1940. In sheep and cattle preliminary surveys indicated that approximately 40 percent were infested. (E. C. Cushing, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

CORRECTION:

In the note by G. F. Knowlton, on p. 500 of the Insect Pest Survey Bulletin (v. 20, No. 9, Nov. 1, 1940) Empoasca cucumeris should be E. filamenta De Long.